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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648-XC430

Small Takes of Marine Mammals Incidental to Specified Activities; Cape Wind's High Resolution Survey in Nantucket Sound, MA

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice; proposed incidental harassment authorization; request for comments.

SUMMARY: NMFS has received an application from Cape Wind Associates (CWA) for an Incidental Harassment Authorization (IHA) to take marine mammals, by harassment, incidental to pre-construction high resolution survey activities. CWA began pre-construction activities last year, but was unable to complete the entire survey. Pursuant to the Marine Mammal Protection Act (MMPA), NMFS is requesting comments on its proposal to issue a second IHA to CWA to incidentally take, by Level B harassment only, marine mammals during the specified activity.

DATES: Comments and information must be received no later than [insert date 30 days after date of publication in the FEDERAL REGISTER].

ADDRESSES: Comments on the application and this proposal should be addressed to Michael Payne, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910-3225. The mailbox address for providing email comments is ITP.Magliocca@noaa.gov. NMFS is not responsible for e-mail comments sent to addresses other than the one provided here. Comments sent via e-mail, including all attachments, must not exceed a 10-megabyte file size.

Instructions: All comments received are a part of the public record and will generally be posted to <http://www.nmfs.noaa.gov/pr/permits/incidental.htm> without change. All Personal Identifying Information (for example, name, address, etc.) voluntarily submitted by the commenter may be publicly accessible. Do not submit Confidential Business Information or otherwise sensitive or protected information.

A copy of the application containing a list of the references used in this document may be obtained by visiting the internet at: <http://www.nmfs.noaa.gov/pr/permits/incidental.htm>. The following associated documents are also available at the same internet address: 2011 Environmental Assessment. Documents cited in this notice may also be viewed, by appointment, during regular business hours, at the aforementioned address.

FOR FURTHER INFORMATION CONTACT: Michelle Magliocca, Office of Protected Resources, NMFS, (301) 427-8401.

SUPPLEMENTARY INFORMATION:

Background

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 et seq.) direct the Secretary of Commerce to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specific geographical region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of a proposed authorization is provided to the public for review.

Authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), will not have an unmitigable adverse impact

on the availability of the species or stock(s) for subsistence uses (where relevant), and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring, and reporting of such takings are set forth. NMFS has defined "negligible impact" in 50 CFR 216.103 as "...an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival."

Section 101(a)(5)(D) of the MMPA established an expedited process by which citizens of the U.S. can apply for a 1-year authorization to incidentally take small numbers of marine mammals by harassment, provided that there is no potential for serious injury or mortality to result from the activity. Section 101(a)(5)(D) establishes a 45-day time limit for NMFS review of an application followed by a 30-day public notice and comment period on any proposed authorizations for the incidental harassment of marine mammals. Within 45 days of the close of the comment period, NMFS must either issue or deny the authorization.

Except with respect to certain activities not pertinent here, the MMPA defines "harassment" as: any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment].

Summary of Request

On December 19, 2012, NMFS received an application from CWA for the taking of marine mammals incidental to high resolution survey activities. NMFS determined that the application was adequate and complete on December 31, 2012.

CWA proposes to conduct a high resolution geophysical survey in Nantucket Sound, Massachusetts. The proposed activity would occur during daylight hours over an estimated 109-day period beginning in April 2013. The following equipment used during the survey is likely to result in the take of marine mammals: shallow-penetration subbottom profiler and medium-penetration subbottom profiler. Take, by Level B harassment only, of individuals of five species is anticipated to result from the specified activity. This request is basically an extension of the request made in April 2011 for survey activities that were not completed under the previous IHA. CWA is not proposing to change their survey activities in any way. However, the geotechnical portion of the survey was completed in 2012 and would not be continued during the 2013 season.

Description of the Specified Activity

CWA proposes to conduct a high resolution geophysical survey in order to acquire remote-sensing data around Horseshoe Shoal which would be used to characterize resources at or below the seafloor. The purpose of the survey would be to identify any submerged cultural resources that may be present and to generate additional data describing the geological environment within the survey area. The survey would satisfy the mitigation and monitoring requirements for “cultural resources and geology” in the environmental stipulations of the Bureau of Ocean Energy Management, Regulation, and Enforcement’s lease. The survey is part of the first phase of a larger Cape Wind energy project, which involves the installation of 130 wind turbine generators on Horseshoe Shoal over a 2-year period. The survey would collect data along predetermined track lines using a towed array of instrumentation, which would include a side scan sonar, magnetometer, shallow-penetration subbottom profiler, multibeam depth

sounder, and medium-penetration subbottom profiler. The proposed high resolution geophysical survey activities would not result in any disturbance to the sea floor.

Dates and Duration

Survey activities are necessary prior to construction of the wind turbine array and are scheduled to begin in the spring of 2013, continuing on a daily basis for up to five months. Survey vessels would operate during daytime hours only and CWA estimates that one survey vessel would cover about 17 Nautical miles (31 kilometers) of track line per day. Therefore, CWA conservatively estimates that survey activities would take 109 days (28 days less than what was expected under the 2012 IHA). However, if more than one survey vessel is used, the survey duration would be considerably shorter. NMFS is proposing to issue an authorization that extends from April 1, 2013, to March 31, 2014.

Location

Survey vessels are expected to depart from Falmouth Harbor, Massachusetts, or another nearby harbor on Cape Cod. In total, the survey would cover approximately 110 square kilometers (km²). This area includes the future location of the wind turbine generators – an area about 8.4 km from Point Gammon, 17.7 km from Nantucket Island, and 8.9 km from Martha's Vineyard – and cables connecting the wind park to the mainland. The survey area within the wind park would be transited by survey vessels towing specialized equipment along primary track lines and perpendicular tie lines. Preliminary survey designs include primary track lines with northwest-southeast orientations and assume 30-meter (m) line spacing. Preliminary survey designs also call for tie lines to likely run in a west-east orientation covering targeted areas of the construction footprint where wind turbine generators would be located. The survey area along the interconnecting submarine cable route includes a construction and anchoring corridor, as part

of the wind farm's area of potential effect. The total track line distance covered during the survey is estimated to be about 3,432 km (as opposed to the 4,292 km included in the 2012 IHA).

Multiple survey vessels may operate within the survey area and would travel at about 3 knots during data acquisition and approximately 15 knots during transit between the survey area and port. If multiple vessels are used at the same time, they would be far enough apart that sounds from the chirp and boomer would not overlap. The survey vessels would acquire data continuously throughout the survey area during the day and terminate survey activities before dark, prior to returning to port. NMFS believes that the likelihood of a survey vessel striking a marine mammal is low considering the low marine mammal densities within Nantucket Sound, the relatively short distance from port to the survey site, the limited number of vessels, and the small vessel size. Vessel sounds during survey activities would result from propeller cavitations, propeller singing, propulsion, flow noise from water dragging across the hull, and bubbles breaking in the wake. The dominant sound source from vessels would be from propeller cavitations; however, sounds resulting from survey vessel activity are considered to be no louder than the existing ambient sound levels and sound generated from regular shipping and boating activity in Nantucket Sound (MMS, 2009).

NMFS expects that acoustic stimuli resulting from the operation of the survey equipment have the potential to harass marine mammals. Background information on the characteristics and measurement of sound are provided later in this document. The dominant sources of sound during the proposed survey activities would be from the towed equipment used to gather seafloor data. Two of the seismic survey devices used during the high resolution geophysical survey emit sounds within the hearing range of marine mammals in Nantucket Sound: shallow-penetration

and medium-penetration subbottom profilers (known as a “chirp” and “boomer,” respectively). CWA would use a chirp to provide high resolution data of the upper 15 m of sea bottom. An EdgeTech 216S or similar model would be used. The chirp would be towed near the center of the survey vessel directly adjacent to the gunwale of the boat, about 1 to 1.5 m beneath the water’s surface. Sources such as the chirp are considered non-impulsive, intermittent (as opposed to continuous) sounds. The frequency range for this instrument is generally 2 to 16 kilohertz (kHz) – a range audible by all marine mammal species in Nantucket Sound. The estimated sound pressure level at the source would be 201 dB re 1 μ Pa at 1 m with a typical pulse length of 32 milliseconds and a pulse repetition rate of 4 per second. NMFS does not consider the chirp to be a continuous sound source (best represented by vibratory pile driving or drilling). CWA would use a boomer to obtain deeper resolution of geologic layering that cannot be imaged by the chirp. An AP3000 (dual plate) boomer, or similar model would be used. The boomer would be towed about 3 to 5 m behind the survey vessel’s stern at the water’s surface. Unlike the chirp, the boomer emits an impulse sound, characterized by a relatively rapid rise-time to maximum pressure followed by a period of diminishing and oscillating pressures (Southall et al., 2007). The boomer has a broad frequency range of 0.3 to 14 kHz – a range audible by all marine mammal species in Nantucket Sound. CWA performed sound source verification monitoring in 2012 on the type of chirp and boomer that would be used during the 2013 survey season. Underwater sound was recorded with two Autonomous Multichannel Acoustic Recorders, deployed 100 m apart, in the vicinity of the project area. The received 90-percent rms sound pressure levels (SPLs) from the subbottom profilers did not exceed 175 dB re 1 μ Pa. The loudest source, the dual-plate boomer, produced a received 90-percent rms SPL of

less than 140 dB re 1 uPa at a 500-m range. The distance to the 160-dB isopleth was 12 m for the dual-plate boomer and 10 m for the chirp.

Description of Marine Mammals in the Area of the Specified Activity

All marine mammals with possible or confirmed occurrence in the proposed activity area are listed in Table 1, along with their status under the Endangered Species Act (ESA) and MMPA. In general, large whales do not frequent Nantucket Sound, but they are discussed below because some species have been reported near the project vicinity.

Table 1. Marine mammals with possible or confirmed occurrence in the proposed activity area.

Common Name	Scientific Name	ESA Status	MMPA Status
Humpback whale	<u>Megaptera novaeangilae</u>	endangered	depleted
Fin whale	<u>Balaenoptera physalus</u>	endangered	depleted
North Atlantic right whale	<u>Eubaelena glacialis</u>	endangered	depleted
Long-finned pilot whale	<u>Globicephalus melas</u>	-	-
Minke whale	<u>Balaenoptera acutorostrata</u>	-	-
Atlantic white-sided dolphin	<u>Lagenorhynchus acutus</u>	-	-
Striped dolphin	<u>Stellena coeruleoalba</u>	-	-
Common dolphin	<u>Delphinus delphis</u>	-	-
Harbor porpoise	<u>Phocoena phocoena</u>	-	-
Atlantic spotted dolphin	<u>Stenella frontalis</u>	-	-
Risso's dolphin	<u>Grampus griseus</u>	-	-
Dwarf and pygmy sperm whale	<u>Kogia spp.</u>	-	-
Gray seal	<u>Halichoerus grypus</u>	-	-
Harbor seal	<u>Phoca vitulina</u>	-	-
Harp seal	<u>Phoca groenlandica</u>	-	-
Hooded seal	<u>Crystophora cristata</u>	-	-

Sightings data indicate that whales rarely visit Nantucket Sound and there are no sightings of large whales on Horseshoe Shoal. Since 2002, no humpback whales have been observed anywhere in Nantucket Sound and there are no documented occurrences of fin whales within Nantucket Sound. Right whales are considered rare in Nantucket Sound and have not been sighted on Horseshoe Shoal. All of the right whales observed in Nantucket Sound during

2010 quickly transited the area and there is no evidence of any persistent aggregations around the proposed project area. The best available science indicates that humpback whales, fin whales, and right whales – although present in the New England region – are rare in Nantucket Sound and transient individuals may be occasionally found 20 km from the proposed project area; this is likely due to the shallow depths of Nantucket Sound and its location outside of the coastal migratory corridor.

Likewise, sightings data shows no record of long-finned pilot whales, striped dolphins, Atlantic spotted dolphins, common dolphins, Risso’s dolphins, Kogia species, harp seals, or hooded seals in Nantucket Sound, although these stocks exist in the New England region. Therefore, CWA is not requesting, nor is NMFS proposing, take for the aforementioned species.

Marine mammals with known occurrences in Nantucket Sound that could be harassed by high resolution geophysical survey activity in Nantucket Sound are listed in Table 2. These are the species for which take is being requested.

Table 1. Marine mammals that could be impacted by survey activities in Nantucket Sound.

Common Name	Scientific Name	Abundance	Population Status	Time of Year in New England
Minke whale	<u>Balaenoptera actinoptera</u>	8,987	stable	April through October
Atlantic white-sided dolphin	<u>Lagenorhynchus acutus</u>	63,000	n/a	October through December
Harbor porpoise	<u>Phocoena phocoena</u>	89,504	n/a	Year-round (peak Sept-Apr)
Gray seal	<u>Halichoerus grypis</u>	250,000	increasing	Year-round
Harbor seal	<u>Phoca vitulina</u>	99,340	n/a	October through April

Minke Whales

In the North Atlantic, minke whales are found from Canada to the Gulf of Mexico and concentrated in New England waters, particularly in the spring and summer months. Minke

whales found in Nantucket Sound are part of the Canadian East Coast stock, which runs from the Davis Strait down to the Gulf of Mexico. The best available abundance estimate for this stock is 8,987 individuals. Sightings data indicate that minke whales prefer shallower waters when in the Cape Cod vicinity, but depths significantly greater than Nantucket Sound. Sightings per unit effort estimates for Nantucket Sound are 0.1 to 5.9 minke whales per 1,000 km of survey track for spring and summer. However, estimates may be biased due to heavier whale watching activities during those months. Minke whales are one of the most abundant whale species in the world and their population is considered stable throughout. The minke whale is not listed under the ESA nor considered strategic under the MMPA.

Atlantic White-sided Dolphin

Atlantic white-sided dolphins are found in temperate and sub-polar waters of the North Atlantic, typically along the continental shelf and slope. In the western North Atlantic, they are found from North Carolina to Greenland. During summer months, Atlantic white-sided dolphins move north and closer to shore. Atlantic white-sided dolphins are rare in Nantucket Sound, but are found in deeper waters around Massachusetts and Rhode Island. In 2011, the estimated population size of the Western North Atlantic stock was about 23,390 animals. There is insufficient data to determine population trends, but Atlantic white-sided dolphins are not listed under the ESA, although they are considered strategic under the MMPA.

Harbor Porpoises

Harbor porpoises have a wide and discontinuous range that includes the North Atlantic and North Pacific. In the western North Atlantic, harbor porpoises are found from Greenland to Cape Hatteras, North Carolina. Harbor porpoises in U.S. waters are divided into 10 stocks,

based on genetics, movement patterns, and management. Any harbor porpoises encountered during the proposed survey activities would be part of the Gulf of Maine/Bay of Fundy stock which has an estimated abundance of 89,054 animals and a minimum population estimate of 60,970 (NMFS, 2011c). They congregate around the Gulf of Maine during summer months, but are otherwise dispersed along the east coast. No trend analyses exist for this species. Harbor porpoises are not listed under the ESA although they are considered strategic under the MMPA.

Gray Seals

Gray seals inhabit temperate and sub-arctic waters. They are found from Maine to Long Island Sound, live on remote, exposed islands, shoals, and unstable sandbars, and are the second most common pinniped along the U.S. Atlantic coast. Three major populations exist in eastern Canada, northwestern Europe, and the Baltic Sea. The western North Atlantic stock is equivalent to the eastern Canada population and ranges from New York to Labrador. Pupping occurs on land or ice from late December through mid-February with peaks in mid-January. Muskeget Island (located between Martha's Vineyard and Nantucket Island) and Monomoy Island (at the eastern limit of Nantucket Sound) are the only gray seal breeding colonies in the U.S. and the southernmost gray seal breeding colonies in the world. These breeding colonies are about 24 km and 14 km from the proposed project site, respectively. Gray seals presently use the islands as areas to give birth and raise their pups. There is no defined migratory behavior for gray seals, so a large portion of the population may be present in Nantucket Sound year-round. Some adults move north during spring and summer, out of Nantucket Sound to the waters off Maine and Canada, but others have been observed in high abundance in Chatham Harbor, MA and other areas of lower Cape Cod during this time.

Incidental observations of seals were recorded during avian aerial surveys conducted independently by CWA and the Massachusetts Audubon Society. Between May 2002 and February 2004, CWA conducted about 46 aerial avian surveys in Nantucket Sound, with particular focus on Horseshoe Shoal. During this time, about 26,873 seals were observed throughout Nantucket Sound; about 56 of these were observed within the proposed project area over the three-year period. Current population numbers for the western North Atlantic stock are unknown, but some pup surveys suggest about 223,220 animals. Gray seal numbers are increasing in coastal waters between southern Massachusetts and eastern Long Island. Their abundance is likely increasing throughout the western Atlantic, but the rate of increase is unknown. Gray seals are not listed under the ESA, nor considered strategic under the MMPA.

Harbor Seals

Harbor seals, also known as common seals, are found throughout coastal waters of the Atlantic Ocean and considered the most abundant pinniped on the U.S. east coast. The best available estimate for the harbor seal population along the New England coast is 99,340 (NMFS, 2011f). They are most common around coastal islands, ledges, and sandbars above 30° N latitude and range from the Arctic down to Nantucket Sound. Harbor seals are seasonal visitors to Massachusetts; breeding and pupping occur through the spring and summer in Maine and Canada. Harbor seals typically over-winter in Massachusetts, but some remain in southern New England year-round. No pupping areas have been identified in southern New England. Extensive sand spits off Muskeget Island and neighboring Tuckernuck and Skiff Islands have been identified as preferred haul-out spots for large numbers of harbor seals.

Harbor seal abundance estimates for Nantucket Sound are scarce. Barlas (1999) observed harbor seals on Cape Cod from October through April and saw abundance peak in March, with very few individuals using haul-out sites in Nantucket Sound. Waring (unpublished data, 2002) observed an increased abundance of harbor seals on Muskeget Island, Monomoy Island, and Tuckernuck Island in 1999 and 2000; however, harbor seals are not likely to be in the same area when gray seals are breeding.

Further information on the biology and local distribution of these species and others in the region can be found in CWA's application, which is available online at:

<http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications>, and the NMFS Marine Mammal Stock Assessment Reports, which are available online at:

<http://www.nmfs.noaa.gov/pr/species>.

Potential Effects of the Specified Activity on Marine Mammals

Use of subbottom profilers on Horseshoe Shoal may temporarily impact marine mammal behavior within the survey area due to elevated in-water sound levels. Marine mammals are continually exposed to many sources of sound. Naturally occurring sounds such as lightning, rain, sub-sea earthquakes, and biological sounds (for example, snapping shrimp, whale songs) are widespread throughout the world's oceans. Marine mammals produce sounds in various contexts and use sound for various biological functions including, but not limited to, (1) social interactions; (2) foraging; (3) orientation; and (4) predator detection. Interference with producing or receiving these sounds may result in adverse impacts. Audible distance, or received levels of sound depend on the nature of the sound source, ambient noise conditions, and the sensitivity of the receptor to the sound (Richardson et al., 1995). Type and significance of marine mammal reactions to sound are likely dependent on a variety of factors including, but not

limited to, (1) the behavioral state of the animal (for example, feeding, traveling, etc.); (2) frequency of the sound; (3) distance between the animal and the source; and (4) the level of the sound relative to ambient conditions (Southall et al., 2007).

For background, sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air or water, and is generally characterized by several variables. Frequency describes the sound's pitch and is measured in hertz (Hz) or kilohertz (kHz), while sound level describes the sound's intensity and is measured in decibels (dB). Sound level increases or decreases exponentially with each dB of change. The logarithmic nature of the scale means that each 10-dB increase is a 10-fold increase in acoustic power (and a 20-dB increase is then a 100-fold increase in power). A 10-fold increase in acoustic power does not mean that the sound is perceived as being 10 times louder, however. Sound levels are compared to a reference sound pressure (micro-Pascal) to identify the medium. For air and water, these reference pressures are "re: 20 μ Pa" and "re: 1 μ Pa," respectively. Root mean square (RMS) is the quadratic mean sound pressure over the duration of an impulse. RMS is calculated by squaring all of the sound amplitudes, averaging the squares, and then taking the square root of the average (Urick, 1975). RMS accounts for both positive and negative values; squaring the pressures makes all values positive so that they may be accounted for in the summation of pressure levels (Hastings and Popper, 2005). This measurement is often used in the context of discussing behavioral effects, in part because behavioral effects, which often result from auditory cues, may be better expressed through averaged units rather than by peak pressures.

Cetaceans are divided into three functional hearing groups: low-frequency, mid-frequency, and high-frequency. Minke whales are considered low-frequency cetaceans and their

estimated auditory bandwidth (lower to upper frequency hearing cut-off) ranges from 7 Hz to 30 kHz. Atlantic white-sided dolphins are considered mid-frequency cetaceans and their estimated auditory bandwidth ranges from 150 Hz to 160 kHz. Lastly, harbor porpoises are considered high-frequency cetaceans and their estimated auditory bandwidth ranges from 200 Hz to 180 kHz. In contrast, pinnipeds are divided into two functional hearing groups: in-water and in-air. Pinnipeds in water have an estimated auditory bandwidth of 75 Hz to 75 kHz. There are no pinniped haul-outs close enough to the survey area to take in-air auditory bandwidths into consideration.

Hearing Impairment

Marine mammals may experience temporary or permanent hearing impairment when exposed to loud sounds. Hearing impairment is classified by temporary threshold shift (TTS) and permanent threshold shift (PTS). There are no empirical data for onset of PTS in any marine mammal; therefore, PTS-onset must be estimated from TTS-onset measurements and from the rate of TTS growth with increasing exposure levels above the level eliciting TTS-onset. PTS is presumed to be likely if the hearing threshold is reduced by ≥ 40 dB (that is, 40 dB of TTS). PTS is considered auditory injury (Southall et al., 2007) and occurs in a specific frequency range and amount. Irreparable damage to the inner or outer cochlear hair cells may cause PTS; however, other mechanisms are also involved, such as exceeding the elastic limits of certain tissues and membranes in the middle and inner ears and resultant changes in the chemical composition of the inner ear fluids (Southall et al., 2007). Due to proposed mitigation measures and source levels, NMFS does not expect marine mammals to be exposed to PTS levels during the proposed survey activities.

Temporary Threshold Shift (TTS)

TTS is the mildest form of hearing impairment that can occur during exposure to a loud sound (Kryter, 1985). While experiencing TTS, the hearing threshold rises and a sound must be stronger in order to be heard. At least in terrestrial mammals, TTS can last from minutes or hours to (in cases of strong TTS) days, can be limited to a particular frequency range, and can occur to varying degrees (i.e., a loss of a certain number of dBs of sensitivity). For sound exposures at or somewhat above the TTS threshold, hearing sensitivity in both terrestrial and marine mammals recovers rapidly after exposure to the noise ends.

Marine mammal hearing plays a critical role in communication with conspecifics and in interpretation of environmental cues for purposes such as predator avoidance and prey capture. Depending on the degree (elevation of threshold in dB), duration (i.e., recovery time), and frequency range of TTS and the context in which it is experienced, TTS can have effects on marine mammals ranging from discountable to serious. For example, a marine mammal may be able to readily compensate for a brief, relatively small amount of TTS in a non-critical frequency range that takes place during a time when the animal is traveling through the open ocean, where ambient noise is lower and there are not as many competing sounds present. Alternatively, a larger amount and longer duration of TTS sustained during a time when communication is critical for successful mother/calf interactions could have more serious impacts if it were in the same frequency band as the necessary vocalizations and of a severity that it impeded communication. The fact that animals exposed to levels and durations of sound that would be expected to result in this physiological response would also be expected to have behavioral responses of a comparatively more severe or sustained nature is also notable and potentially of more importance than the simple existence of a TTS.

Recent literature highlights the inherent complexity of predicting TTS onset in marine mammals, as well as the importance of considering exposure duration when assessing potential impacts (Mooney et al., 2009a, 2009b; Kastak et al., 2007). Generally, with sound exposures of equal energy, quieter sounds (lower SPL) of longer duration were found to induce TTS onset more than louder sounds (higher SPL) of shorter duration (more similar to subbottom profilers). For intermittent sounds, less threshold shift will occur than from a continuous exposure with the same energy (some recovery will occur between intermittent exposures) (Kryter et al., 1966; Ward, 1997). For sound exposures at or somewhat above the TTS-onset threshold, hearing sensitivity recovers rapidly after exposure to the sound ends. Southall et al. (2007) considers a 6 dB TTS (that is, baseline thresholds are elevated by 6 dB) to be a sufficient definition of TTS-onset. NMFS considers TTS as Level B harassment that is mediated by physiological effects on the auditory system; however, NMFS does not consider TTS-onset to be the lowest level at which Level B harassment may occur. Southall et al. (2007) summarizes underwater pinniped data from Kastak et al. (2005), indicating that a tested harbor seal showed a TTS of around 6 dB when exposed to a nonpulse noise at sound pressure level 152 dB re: 1 μ Pa for 25 minutes.

Some studies suggest that harbor porpoises may be more sensitive to sound than other odontocetes (Lucke et al., 2009; Kastelein et al., 2011). While TTS onset may occur in harbor porpoises at lower received levels (when compared to other odontocetes), NMFS 160-dB threshold criteria are based on the onset of behavioral harassment, not the onset of TTS. The potential for TTS is considered within NMFS' analysis of potential impacts from Level B harassment.

Behavioral Disturbance

Behavioral responses to sound are highly variable and context-specific. An animal's perception of and response to (in both nature and magnitude) an acoustic event can be influenced by prior experience, perceived proximity, bearing of the sound, familiarity of the sound, etc. (Southall et al., 2007). If a marine mammal does react briefly to an underwater sound by changing its behavior or moving a small distance, the impacts of the change are unlikely to be significant to the individual, let alone the stock or population. However, if a sound source displaces marine mammals from an important feeding or breeding area for a prolonged period, impacts on individuals and populations could be significant (e.g., Lusseau and Bejder, 2007; Weilgart, 2007). Given the many uncertainties in predicting the quantity and types of impacts of noise on marine mammals, it is common practice to estimate how many mammals would be present within a particular distance of activities and/or exposed to a particular level of sound. In most cases, this approach likely overestimates the numbers of marine mammals that would be affected in some biologically-important manner.

The studies that address responses of low-frequency cetaceans (such as the minke whale) to non-pulse sounds include data gathered in the field and related to several types of sound sources (of varying similarity to chirps), including: vessel noise, drilling and machinery playback, low-frequency M-sequences (sine wave with multiple phase reversals) playback, tactical low-frequency active sonar playback, drill ships, and non-pulse playbacks. These studies generally indicate no (or very limited) responses to received levels in the 90 to 120 dB re: 1 μ Pa range and an increasing likelihood of avoidance and other behavioral effects in the 120 to 160 dB range. As mentioned earlier, though, contextual variables play a very important role in the reported responses and the severity of effects are not linear when compared to received level.

Also, few of the laboratory or field datasets had common conditions, behavioral contexts, or sound sources, so it is not surprising that responses differ.

The studies that address responses of mid-frequency cetaceans (such as Atlantic white-sided dolphins) to non-pulse sounds include data gathered both in the field and the laboratory and related to several different sound sources (of varying similarity to chirps) including: pingers, drilling playbacks, ship and ice-breaking noise, vessel noise, Acoustic harassment devices (AHDs), Acoustic Deterrent Devices (ADDs), mid-frequency active sonar, and non-pulse bands and tones. Southall et al. (2007) were unable to come to a clear conclusion regarding the results of these studies. In some cases animals in the field showed significant responses to received levels between 90 and 120 dB, while in other cases these responses were not seen in the 120 to 150 dB range. The disparity in results was likely due to contextual variation and the differences between the results in the field and laboratory data (animals typically responded at lower levels in the field).

The studies that address responses of high-frequency cetaceans (such as the harbor porpoise) to non-pulse sounds include data gathered both in the field and the laboratory and related to several different sound sources (of varying similarity to chirps), including: pingers, AHDs, and various laboratory non-pulse sounds. All of these data were collected from harbor porpoises. Southall et al. (2007) concluded that the existing data indicate that harbor porpoises are likely sensitive to a wide range of anthropogenic sounds at low received levels (around 90 to 120 dB), at least for initial exposures. All recorded exposures above 140 dB induced profound and sustained avoidance behavior in wild harbor porpoises (Southall et al., 2007). Rapid habituation was noted in some but not all studies.

The studies that address the responses of pinnipeds in water to non-pulse sounds include data gathered both in the field and the laboratory and related to several different sound sources (of varying similarity to chirps), including: AHDs, various non-pulse sounds used in underwater data communication, underwater drilling, and construction noise. Few studies exist with enough information to include them in the analysis. The limited data suggest that exposures to non-pulse sounds between 90 and 140 dB generally do not result in strong behavioral responses of pinnipeds in water, but no data exist at higher received levels (Southall et al., 2007).

Southall et al. (2007) also addressed behavioral responses of marine mammals to impulse sounds. The studies that address the responses of low-frequency cetaceans to impulse sounds include data gathered in the field and related to two sound sources: airguns and explosions. The onset of significant behavioral disturbance varied between 120 and 160 dB, depending on species. The studies that address the responses of mid-frequency cetaceans to impulse sounds include data gathered both in the field and the laboratory and related to several different sound sources (of varying similarity to boomers), including: small explosives, airgun arrays, pulse sequences, and natural and artificial pulses. The data show no clear indication of increasing probability and severity of response with increasing received level. Behavioral responses seem to vary depending on species and stimuli. Data on behavioral responses of high-frequency cetaceans to multiple pulses is not available. Although individual elements of some non-pulse sources (such as pingers) could be considered pulses, it is believed that some mammalian auditory systems perceive them as non-pulse sounds (Southall et al., 2007).

The studies that address the responses of pinnipeds in water to impulse sounds include data gathered in the field and related to several different sources (of varying similarity to

boomers), including: small explosives, impact pile driving, and airgun arrays. Quantitative data on reactions of pinnipeds to impulse sounds is limited, but a general finding is that exposures in the 150 to 180 dB range generally have limited potential to induce avoidance behavior (Southall et al., 2007).

Any impacts to marine mammal behavior are expected to be temporary. Animals may avoid the area around the survey vessels, thereby reducing exposure. Any disturbance to marine mammals is likely to be in the form of temporary avoidance or alteration of opportunistic foraging behavior near the survey location. In addition, because protected species observers would be monitoring a 500-m exclusion zone (much larger than the 30-m, 180-dB isopleth in which Level A harassment could occur), marine mammal injury or mortality is not anticipated. The protected species observers would be on watch to stop survey activities, a mitigation measure designed to prevent animals from being exposed to injurious level sounds. For these reasons, any changes to marine mammal behavior are expected to be temporary and result in a negligible impact to affected species and stocks.

Anticipated Effects on Habitat

There is no anticipated impact on marine mammal habitat from the proposed survey activities. The high resolution geophysical survey equipment would not come in contact with the seafloor and would not be a source of air or water pollution. Marine mammals may avoid the survey area temporarily due to ensonification, but survey activities are not expected to result in long-term abandonment of marine mammal habitat. A negligible area of seafloor would be temporarily disturbed during the collection of geotechnical data.

Overall, the proposed activity is not expected to cause significant impacts on marine mammal habitat or marine mammal prey species in the proposed survey area. Therefore, NMFS has preliminarily determined impacts to marine mammal habitat are negligible.

Proposed Mitigation

In order to issue an incidental take authorization under section 101(a)(5)(D) of the MMPA, NMFS must, where applicable, set forth the permissible methods of taking pursuant to such activity, and other means of effecting the least practicable impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for taking for subsistence uses where relevant.

CWA proposed, with NMFS' guidance, the following mitigation measures to help ensure the least practicable adverse impact on marine mammals:

Establishment of an Exclusion Zone

During all survey activities involving the shallow-penetration and medium-penetration subbottom profilers, CWA would establish a 500-m radius exclusion zone around each survey vessel. This area would be monitored for marine mammals 60 minutes (as stipulated by the BOEMRE lease) prior to starting or restarting surveys, and during surveys, and 60 minutes after survey equipment has been turned off. Typically, the exclusion zone is based on the area in which marine mammals could be exposed to injurious (Level A) levels of sound. CWA's lease specifies a 500-m exclusion zone, which exceeds both the estimated Level A and Level B isopleths for marine mammal harassment. CWA' proposed exclusion zone would minimize

impacts to marine mammals from increased sound exposures. The exclusion zone must not be obscured by fog or poor lighting conditions.

Shut Down and Delay Procedures

If a protected species observer sees a marine mammal within or approaching the exclusion zone prior to the start of surveying, the observer would notify the appropriate individual who would then be required to delay surveying until the marine mammal moves outside of the exclusion zone or if the animal has not been resighted for 60 minutes. If a protected species observer sees a marine mammal within or approaching the exclusion zone during survey activities, the observer would notify the appropriate individual who would then be required to shut down surveying until the marine mammal moves outside of the exclusion zone or if the animal has not been resighted for 60 minutes.

Soft-start Procedures

A “soft-start” technique would be used at the beginning of survey activities each day (or following a shut down) to allow any marine mammal that may be in the immediate area to leave before the sound sources reach full energy. Surveys shall not commence at nighttime or when the exclusion zone cannot be effectively monitored.

NMFS has carefully evaluated the applicant’s proposed mitigation measures and considered a range of other measures in the context of ensuring that NMFS prescribes the means of effecting the least practicable adverse impact on the affected marine mammal species and stocks and their habitat. Our evaluation of potential measures included consideration of the following factors in relation to one another:

- The manner in which, and the degree to which, the successful implementation of the measure is expected to minimize adverse impacts to marine mammals;

- The proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and
- The practicability of the measure for applicant implementation, including consideration of personnel safety, and practicality of implementation.

Based on our evaluation of the applicant's proposed measures, as well as other measures considered by NMFS, NMFS has preliminarily determined that the proposed mitigation measures provide the means of effecting the least practicable adverse impacts on marine mammals species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Proposed Monitoring and Reporting

In order to issue an incidental take statement for an activity, section 101(a)(5)(D) of the MMPA states that NMFS must set forth, where applicable, "requirements pertaining to the monitoring and reporting of such taking." The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for incidental take authorizations must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the proposed action area.

Visual Monitoring

CWA would designate at least one biologically-trained, on-site individual, approved in advance by NMFS, to monitor the area for marine mammals 60 minutes before, during, and 60 minutes after all survey activities and call for shut down if any marine mammal is observed within or approaching the designated 500-m exclusion zone. Should a marine mammal not

included in an incidental take authorization be observed at any time within the 500-m exclusion zone, shut down and delay procedures would be followed.

CWA would also provide additional monitoring efforts that would result in increased knowledge of marine mammal species in Nantucket Sound. At least one NMFS-approved protected species observer would conduct behavioral monitoring from the survey vessel for two days for every 14 days of survey activity to estimate take and evaluate the behavioral impacts that survey activities have on marine mammals outside of the 500-m exclusion zone. In addition, CWA would also send out an additional vessel with a NMFS-approved protected species observer to collect data on species presence and behavior before surveys begin and once a month during survey activities.

Protected species observers would be provided with the equipment necessary to effectively monitor for marine mammals (for example, high-quality binoculars, compass, and range-finder) in order to determine if animals have entered into the harassment isopleths and to record marine mammal sighting information. Protected species observers must be able to effectively monitor the 500-m exclusion zone whenever the subbottom profilers are in use. Survey efforts would only take place during daylight hours and visibility must not be obscured by fog, lighting conditions, etc.

CWA would submit a report to NMFS within 90 days of expiration of the IHA or completion of surveying, whichever comes first. The report would provide full documentation of methods, results, and interpretation pertaining to all monitoring. More specifically, the report would include the following information when a marine mammal is sighted:

- Dates, times, locations, heading, speed, weather, sea conditions (including Beaufort sea state and wind force), and associated activities during all survey operations and marine mammal sightings;
- Species, number, location, distance from the vessel, and behavior of any marine mammals, as well as associated survey activity (number of shut-downs or delays), observed throughout all monitoring activities;
- An estimate of the number (by species) of marine mammals that are known to have been exposed to the survey activity (based on visual observation) at received levels greater than or equal to 160 dB re 1 uPa (rms) and/or 180 dB re 1 uPa (rms) for cetaceans and 190 dB re 1 uPa (rms) for pinnipeds with a discussion of any specific behaviors those individuals exhibited; and
- A description of the implementation and effectiveness of the mitigation measures of the IHA.

In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by the IHA, such as an injury (Level A harassment), serious injury, or mortality (e.g., ship-strike, gear interaction, and/or entanglement), CWA would immediately cease the specified activities and report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, at 301-427-8401 and/or by email to Michael.Payne@noaa.gov and ITP.Magliocca@noaa.gov and the Northeast Regional Stranding Coordinator at 978-281-9300 (Mendy.Garron@noaa.gov). The report must include the following information:

- Time, date, and location (latitude/longitude) of the incident;

- Name and type of vessel involved;
- Vessel's speed during and leading up to the incident;
- Description of the incident;
- Status of all sound source use in the 24 hours preceding the incident;
- Water depth;
- Environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, and visibility);
- Description of all marine mammal observations in the 24 hours preceding the incident;
- Species identification or description of the animal(s) involved;
- Fate of the animal(s); and
- Photographs or video footage of the animal(s) (if equipment is available).

Activities would not resume until NMFS is able to review the circumstances of the prohibited take. NMFS would work with CWA to determine what is necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. CWA may not resume their activities until notified by NMFS via letter, email, or telephone.

In the event that CWA discovers an injured or dead marine mammal, and the lead PSO determines that the cause of the injury or death is unknown and the death is relatively recent (i.e., in less than a moderate state of decomposition as described in the next paragraph), CWA would immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, at 301-427-8401 and/or by email to Michael.Payne@noaa.gov and ITP.Magliocca@noaa.gov and the Northeast Regional Stranding Coordinator at 978-281-9300 (Mendy.Garron@noaa.gov). The report must include the same information identified in the paragraph above. Activities may continue while NMFS reviews the circumstances of the

incident. NMFS would work with CWA to determine whether modifications in the activities are appropriate.

In the event that CWA discovers an injured or dead marine mammal, and the lead PSO determines that the injury or death is not associated with or related to the activities authorized in the IHA (e.g., previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), CWA would report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, at 301-427-8401 and/or by email to Michael.Payne@noaa.gov and ITP.Magliocca@noaa.gov and the Northeast Regional Stranding Coordinator at 978-281-9300 (Mendy.Garron@noaa.gov), within 24 hours of the discovery. CWA would provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS.

Summary of Past Monitoring and Reporting

CWA complied with the requirements under their 2012 IHA. CWA completed 28 days and 459 nautical transect miles of survey activity during 2012 and no living marine mammals were sighted. On July 10, 2012, a deceased harbor seal was seen by two protected species observers and survey equipment was immediately shut down. The observers determined that the seal had been deceased for 24-48 hours, based on signs of scavenger damage and bloating, which suggest moderate decomposition (Pugliares *et al.*, 2007). Both observers concurred that the animal was not injured due to survey activities; however, a 60-minute post watch was performed to ensure that no other protected species were in the vicinity. A full report was submitted to NMFS on July 11, 2012, within 24 hours of the initial sighting. No marine mammal takes were

reported during the 2012 season. CWA's monitoring report is available online at:

<http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications>.

Estimated Take by Incidental Harassment

Except with respect to certain activities not pertinent here, the MMPA defines "harassment" as: any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment].

Based on CWA's application and NMFS' subsequent analysis, the impact of the described survey activities may result in, at most, short-term modification of behavior by small numbers of marine mammals within the action area. Marine mammals may avoid the area or change their behavior at time of exposure to elevated sound levels.

Current NMFS practice regarding exposure of marine mammals to anthropogenic sound is that in order to avoid the potential for injury of marine mammals (for example, PTS), cetaceans and pinnipeds should not be exposed to impulsive sounds of 180 and 190 dB re: 1 μ Pa or above, respectively. This level is considered precautionary as it is likely that more intense sounds would be required before injury would actually occur (Southall *et al.*, 2007). Potential for behavioral harassment (Level B) is considered to have occurred when marine mammals are exposed to sounds at or above 160 dB re: 1 μ Pa for impulse sounds and 120 dB re: 1 μ Pa for non-pulse noise, but below the aforementioned thresholds. These levels are also considered precautionary.

CWA estimated the number of potential takes resulting from survey activities by considering species density, the zone of influence, and duration of survey activities. More specifically, take estimates were calculated by multiplying the estimated species density values (n) measured in individuals per square kilometers, by the area of the zone of influence in km², times the total number of survey days (d = 109). The zone of influence was calculated as a function of the distance a survey vessel with deployed boomer would travel in one survey day and the area around the boomer where sound levels reach or exceed 160 dB. For consistency with the 2011 IHA, the take estimate is based on a zone of influence equal to 444 m (the initial estimate for the 160 dB isopleth for the boomer), although based on acoustic measurements taken at the beginning of the 2012 survey, the 160 dB isopleth is thought to be much smaller. This distance was applied consistently to all marine mammal species.

Estimated numbers of species potentially exposed to disturbing levels of sound from the boomer (the survey equipment with the largest 160 dB isopleth) were calculated for minke whales, Atlantic white-sided dolphins, harbor porpoises, gray seals, and harbor seals. These estimates were calculated by multiplying the low and high end of the ranges of species density by the boomer's zone of influence and the number of days of survey operation. CWA calculated seal density estimates based on aerial survey counts for seals observed swimming and/or foraging in open water within the activity area. CWA included an adjustment factor in these density calculations for seals not seen, but considered present during aerial surveys. Density estimates for seals based on haul out counts were not used due to the distance of haul outs from the activity area (about 20 km to Monomoy Island and 12 km to Muskeget Island). Gray seals and harbor seals congregating in these locations are not expected to hear sounds from the survey

equipment at 160 dB or higher. The seals most likely to be exposed to potentially disturbing sounds are the individuals swimming and/or foraging within the zone of influence for the activated medium-penetration subbottom profiler.

CWA is requesting incidental take based on the highest estimated possible species exposures to potentially disturbing levels of sound from the boomer. No marine mammals are expected to be exposed to injurious levels of sound in excess of 180 dB during survey activities. CWA is requesting, and NMFS is proposing, Level B harassment of 9 minke whales, 185 Atlantic white-sided dolphins, 110 harbor porpoises, 314 gray seals, and 79 harbor seals. These numbers overestimate the number of animals likely to be taken because they are based on the highest density estimates and do not account for proposed mitigation measures (such as the 500-m exclusion zone, marine mammal monitoring, and ramp up procedures). These numbers indicate the maximum number of animals expected to occur within 444 m of the boomer. Estimated and proposed level of take of each species is less than one percent of each affected stock and therefore is considered small in relation to the stock estimates previously set forth.

Negligible Impact and Small Numbers Analysis and Determination

NMFS has defined "negligible impact" in 50 CFR 216.103 as "...an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival." In making a negligible impact determination, NMFS considers a number of factors which include, but are not limited to, number of anticipated injuries or mortalities (none of which would be authorized here), number, nature, intensity, and duration of Level B harassment, and the context in which takes occur (for instance, will the takes occur in an area or time of significance for marine mammals, or are takes occurring to a small, localized population?).

As described above, marine mammals would not be exposed to activities or sound levels which would result in injury (for instance, PTS), serious injury, or mortality. Anticipated impacts of survey activities on marine mammals are temporary behavioral changes due to avoidance of the area. All marine mammals in the vicinity of survey operations would be transient as no breeding, calving, pupping, or nursing areas, or haul-outs, overlap with the survey area. The closest pinniped haul-outs are about 20 km and 12 km away on Monomoy Island and Muskeget Island, respectively. Marine mammals approaching the survey area would likely be traveling or opportunistically foraging. The amount of take CWA requested, and NMFS proposes to authorize, is considered small (less than one percent) relative to the estimated populations of 8,987 minke whales, 23,390 Atlantic white-sided dolphins, 89,054 harbor porpoises, 250,000 gray seals, and 99,340 harbor seals. Furthermore, the amount of take CWA requested and NMFS proposes to authorize likely overestimates the actual take that would occur; no marine mammal takes were observed during 28 days of survey activity in 2012. No affected marine mammals are listed under the ESA and only the Atlantic white-sided dolphin and harbor porpoise are considered strategic under the MMPA. Marine mammals are expected to avoid the survey area, thereby reducing exposure and impacts. No disruption to reproductive behavior is anticipated and there is no anticipated effect on annual rates of recruitment or survival of affected marine mammals.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the mitigation and monitoring measures, NMFS preliminarily determines that CWA's survey activities would result in the incidental take of small numbers of marine mammals, by Level B

harassment, and that the total taking would have a negligible impact on the affected species or stocks.

Impact on Availability of Affected Species for Taking for Subsistence Uses

There are no relevant subsistence uses of marine mammals implicated by this action.

Endangered Species Act (ESA)

No marine mammal species listed under the ESA are anticipated to occur within the action area. Therefore, section 7 consultation under the ESA is not required.

National Environmental Policy Act (NEPA)

In compliance with the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.), as implemented by the regulations published by the Council on Environmental Quality (40 CFR parts 1500-1508), and NOAA Administrative Order 216-6, NMFS prepared an Environmental Assessment (EA) to consider the direct, indirect, and cumulative effects to marine mammals and other applicable environmental resources resulting from issuance of a one-year IHA and the potential issuance of additional authorization for incidental harassment for the ongoing project in 2012. This analysis is still considered relevant for the proposed IHA because the applicant's proposed activity has not changed. This EA is available on the NMFS website listed in the beginning of this document.

Dated: January 29, 2013

Helen M. Golde,
Acting Director,
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National Marine Fisheries Service.

